WOLF

PRELIMINARY REPORT

Prepared for:

Emroch & Kilduff
Attn: Mr. William Kilduff
3600 W. Broad Street, #700
Richmond, Virginia 23230

By: William E. Dickinson, P.E.
On: August 28, 2020

Your Reference: Richard Walker v X-Stand
Wolf Project No.: 19-0091-3587

EXHIBIT
tabbies
B

Wolf Technical Services, Inc.◦ 9855 Crosspoint Blvd. Suite 126 ◦ Indianapolis, IN 46256
(800) 783-9653 ◦ (317) 842-6075 ◦ FAX (317) 842-6974

dynamic loading, and ideal conditions, the cable assembly can only support approximately 2.4 times its rated capacity, which is a design factor of only 2.4. Wire rope design guidelines recommend a design factor of at least 5.

To meet the design requirement for a minimum design factor or factor of safety of 5 with a maximum tension of 770 pounds for a 300 pound climber, the cable would need to support 5 times 770 or 3,850 pounds. If the load could be equally distributed over the two wire rope sections, each wire rope would need to have a minimum breaking strength of approximately 2,000 pounds. In a 7x7 configuration that would require a wire rope with a diameter of $^{5}/_{32}$ inch.

The Summit climbing tree stand Wolf examined and tested uses a ¼ inch diameter wire rope in a 1x19 configuration. The Wire Rope User's Manual lists the minimum breaking strength for galvanized and corrosion-resistant wire rope. The minimum breaking strength shown in the Wire Rope User's Manual for ¼ inch diameter 1x19 galvanized and corrosion-resistant wire rope is 8,200 pounds. The 8,200 pound minimum breaking strength of a ¼ inch wire rope is over 4 times the minimum breaking strength of the two $^{3}/_{32}$ wire rope sections used in the X-Stand cable. Wolf calculated that the design factor for a climbing tree stand should be 6 to 8. The working load for the ¼ inch diameter wire rope would be $^{1}/_{8}$ to $^{1}/_{6}$ of the minimum breaking strength, which would be 1,025 to 1,367 pounds. This would provide a design factor, or factor of safety, for the Summit wire rope of 6 to 8. With the single ¼ inch diameter wire rope the maximum working load that should be applied to the Summit cable assembly would 1,025 to 1,367 pounds.

With 300 pounds of static weight applied to the Summit stand, the measured tension in each side of the cable was approximately 400 pounds. Dynamic testing, with a 180 pound climber, resulted in a peak load of approximately 407 pounds per cable assembly side and a peak load that was 1.7 times greater than the average static tensile force. For a 300 pound climber and a static tensile force of 400 pounds, it would be expected that peak tensile forces would be approximately 680 pounds per cable assembly segment. All the forces on the Summit cable were well below the working load of the ¼ inch cable using a design factor of 6 to 8. The Summit cable assembly provided a design factor or factor of safety of 12 where the X-Stand cable assembly provided a design factor or factor of safety of 2.4, based on Wolf's testing. In addition, the Summit cable did not fail catastrophically. Instead of the wire rope failing, the crimped cable stop slid along the cable. With this type of failure, the hunter nor the stand would be released from the tree. In fact, the hunter could still, carefully, descend the tree after a crimped cable stop on the Summit cable had slid.

X-Stand Replacement Cables

Recently, Mr. Walker received replacement cables from X-Stand for his X-Stand climbing tree stands. It is our understanding that Mr. Walker did not order these new cables, and X-

Stand mailed them to him. The cables were accompanied by a note. The note is shown below.

Dear Sportsman's Guide Customer,

Our records indicate that you or someone living at this address have purchased one or more X-Stand Silent Adrenaline climbing stands in 2017/2018. We are providing you with a free set of replacement cables to be used on your stand(s). Please replace your current cables with these new ones before using it this fall.

Good luck this hunting season!

X-Stand Treestands
21673 Cedar Ave So
Lakeville, MN 55044

The design of the replacement X-Stand cables received by Mr. Walker and the design of several cables purchased by Wolf have changed. The new design uses plastic segments with the aluminum segments. The aluminum segments are only used for the segments with the hole to secure the cable assembly to the cable supports on foot section and the seat section. All other segments are plastic. In addition some of the plastic segments are shorter. In between the 1¼ inch long aluminum segments there is a ¾ inch long plastic segment and in the area where the fixed end is attached to the cable support there are two $^{9}/_{16}$ inch long plastic segments with the edges beveled. In general, the plastic segments will cause less wear on the wire rope and which should increase the life of the wire rope. The shorter plastic segments in conjunction with the longer aluminum segments will make the cable assembly more flexible and will reduce wear and stress on the wire rope. The short, $^{9}/_{16}$ inch long segments with the beveled edges that have been installed in the area where Mr. Walker's cable failed will make the cable assembly more flexible, decrease the wear on the wire rope, increase the bend radius of the wire rope as it circles the tree, and will reduce stress and fatigue on the wire rope. It appears that X-Stand is aware of at least some of the problems in the design of their cable assembly and have redesigned the cable assembly to reduce the wear on the wire rope, the stress induced to the wire rope during use and the fatigue inflicted on the wire rope during use. They have not increased the design factor or factor of safety of the wire rope. The revisions introduced by X-Stand fail to increase the working load of the cable assembly resulting in a factor of safety that is inadequate and as dangerous as the original design.

Hazard Avoidance

A part of designing a product is looking at the potential failure modes or hazards and appropriately determining the design aspects needed to eliminate the failure mode or hazard. There is a simple process that designers should use to analyze designs and eliminate hazards. This is best illustrated using a safety analysis technique called "the hazard avoidance tree".